Review Article

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A Review of Amaranthus Spinosus Linn: A Potential Medicinal Plant

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Abstract

Amaranthus spinosus Linn. (Family Amaranthaceae), a very common Indian plant is known for prickly amaranth, Spiny pigweed, in hindi Cauleyi, cholai, kanteli. its medicinal properties and commonly known as cultivated throughout in India and warm temperate regions of Asia from Japan to Indonesia. It is erect spinous annual or perennial herb varying in color from green to purple, native to tropical America. In Indian traditional system of medicine (Ayurveda) the plant is used as febrifuge, antipyretic, laxative and diuretic. Besides its culinary value, it is used to repute for treat digestible, bronchitis, appetizer, biliousness, haematinic, stomachic, nausea, flatulence, anorexia, blood diseases, burning sensation, leucorrhoea, leprosy and piles The studies on A. spinosus have been carried out by various researchers and a wide spectrum of its pharmacological actions have been explored which may include antidiabetic, antitumor, analgesic, antimicrobial, anti-inflammatory, spasmolytic, bronchodilator, hepato-protective, spermatogenic, antifertility, antimalarial, antioxidant properties, etc. The present review is an effort to provide a comprehensive review on morphology, traditional uses, phytochemical constituents and pharmacological activities of A. Spinosus.

Keywords: Amranthaceae; Prickly Amaranth; Spiny Pigweed.

Introduction

Amaranthus spinosusLinn, is one such plant that has been frequently used in traditional system of medicine. A. spinosus Linn. (Family: Amaranthaceae) is commonly known as ''Kate Wali Chaulai (Kanatabhajii)" in Hindi, Mulla-dantu, mulladantu, mulluharivesoppu in kannada, used as vegetable and cultivated throughout India, Sri Lanka and many tropical countries. The genus Amaranthus is represented by approximately 60 species (Uphof 1968, Willis et al. 1973, Sigh et al. 1983, Wiersema and Leon 1999), widely distributed in tropical, subtropical and temperate regions. At least 20 species of pigweed are important as weeds, some as ornamental plants and others are utilized as food, leaf vegetables and cereals (Kissmann and Groth 1999) The juice of A. spinosus is used by tribes in Kerala, India to prevent swelling around stomach while the leaves are boiled without salt and consumed for 2-3 days to cure jaundice. The plant is consumed as a vegetable for its high concentration of antioxidant components and high nutritive values due to presence of fiber, proteins and high concentration of essential amino acids, especially lysine. The root is used as an expectorant; lessens the menstrual flow, useful in leucorrhoea and leprosy. The seed is usedas a poultice for broken bones. In the last decade, manyactive secondary metabolites have been isolated andscreened for variousin-vivoand in-vitro pharmacological activities, which suggested its uses in promoting and maintaining health. [1,2]

Vernacular Names [3]

- English: prickly amaranth, Spiny pigweed.
- Hindi: Cauleyi, cholai, kanteli
- Kannada: Mulla-dantu, mulladantu, mulluharivesoppu,
- Malayalam: Cerucira, mullanchira,
- Marathi: kantebhaji, tandulja.
- Sanskrit: tanduleeya, tanduliyaka,

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- Tamil: Mulluk-kirai n
- Telugu: mundlatotakura

Taxonomic Classification [3]

- Kingdom : Plantae
- Subkingdom : Tracheobionta
- Subdivision : Spermatophyta
- Division : Magnoliophyta
- Class : Magnoliopsida
- Subclass : Caryophyllidae
- Order : Caryophyllales
- Family : Amaranthaceae
- Genus : Amaranthus Linn.
- Species : Amaranthus spinosus Linn.

Morphology

It is an erect spinous annual herb growing upto the height of 30-120 cm, with red stem and petioles. Pairs of slender sharp-pointed spines measuring 6-10 mm long at the axils of the leaves and branches. Leaves are simple, alternate, ovate or lanceolate. Stems are glabrous, reddish with many grooved branches and with sharp divaricated spines. Flowers are appears in clusters. Fruit capsule is about 1.5mm long which contents black colored are minute, shining seeds. It is lens shaped and 0.5 mm in diameter. The seed is about 1 mm in diameter, shiny, compressed, black or brownish-black in colour.

Phytochemical investigations prove its importance as valuable medicinal plant. It is known as rich source of alkaloids, flavonoids, glycosides, phenolic acids, steroids, amino acids, terpenoids, lipids, saponin, betalain, b-sitosterol, stigmasterol, linoleic acid, rutin, catechuic tannins and carotenoids.[4]

Traditional Uses

The juice of A. spinosus is used by tribal of Kerala, India to prevent swelling around stomach while the leaves are boiled without salt and consumed for 2–3 days to cure jaundice. It is used as anti-inflammatory, antimalarial, antibacterial, antimicrobial, antidiuretic, antiviral and hepatic disorders. The plant possess hepatoprotective, antioxidant activity, water extract of plant showed significant immune-stimulating activity and stem extract showed antimalarial activities. It used internally in the treatment of internal bleeding, diarrhoea and in excessive menstruation. In Indian traditional system of medicine (Ayurveda) the plant is used as febrifuge, antipyretic, laxative and diuretic. Besides its culinary value, it is a popular medicinal plant used to reputed for treat digestible, bronchitis, appetizer, biliousness, galactagogue, haematinic, stomachic effects, nausea, flatulence, anorexia, blood diseases, burning sensation, leucorrhoea, leprosy, piles and as a treatment for hallucination, healing of wounds and rheumatism, and to arrest the coughing up of blood. All parts of the plant are known to contain medicinally active constituents. Medicinal uses of Amaranthus spinosus Linn. as mentioned in Ayurvedic text is: Leaf infusion is diuretic and used in anemia. Root paste is used in gonorrhoea, eczema, menorrhoea etc. Ethnic use of this plant is mainly with village people of Sikkim who use leaf infusion of in stomach disorder especially in case of indigestion and peptic ulcer. The leaves and roots are applied as poultice to relief bruises, abscesses, burns, wound, inflammation, menorrhagia, gonorrhoea, eczema, gastroenteritis, gall bladder inflammation, arthritis and for the treatment of snakebites. The plant is used in the treatment of abdominal pain, chicken pox, dysentery, dysurea, fever, hysteria, malaria, mania, tonsillitis & vomiting. The root is also used for toothaches. In many countries, including those in Africa, the bruised leaves are considered a good emollient and applied externally in cases of ulcerated mouths, eczema, burns, wounds, boils, earache and hemorrhoids. The plant ash in a solution is used to wash sores. The plant sap is used as an eye wash to treat ophthalmia and convulsions in children.*[5]*

Anti in Flammatory Activity

The methanol extract of Amaranthus spinosus L. leaves was evaluated for anti-inflammatory activities in different animal models. The effect of the plant extract was also studied on castor oil–induced diarrhea and gastric mucosal integrity. The extract (25–100 mg/kg) inhibited the carrageenan-induced rat paw edema and produced significant ($p < 0.05$) inhibition of acetic acidinduced increased vascular permeability. Inhibition of the cotton pellet granuloma was alsoinhibited by 100 mg/kg of the plant extract. Analgesic activity was exhibited with the significa nt anddose-related reduction in the number of writhings induced with acetic acid, as well reduction in pawlicking induced by injection of formalin in mice. The extract (50 and 100 mg/kg) produced gastricer osion in rats,

following repeated administration for 4 days, and with 25–100 mg/kg of the extract,there was a statistically significant ($p < 0.05$) reduction in cast or oilinduced diarrhea in rats. These results demonstrate the anti-inflam matory properties of the leaf extract of A. spinos us. It is alsosuggested that the plant extract probably acts by the inhibition of prostaglandin biosynthesis.*[6]*

The Antioxidant Activity

A. spinosuswas studied in roadside plants which was postulated to be continuously exposed to the high levels of pollutants suchas nitrogen oxides and sulfur dioxides from automobile emission. A. spinosus possess a very good free radical scavenging system for combating air pollution through analysis of the enzymes (i.e superoxide dismutase, catalase, ascorbate peroxidase, glutathione reductase and phenolic peroxidase) activities 18. Amaranthaceae plants contain betalain pigments which show antioxidant activities by the DPPH assay. Their EC 50 values range from 3.4-8.4 µM. The antioxidant activity of A. Spinosus extract may bedue to its bottling content.*[6]*

Anti Diabetic Activity

The alpha amylase and the antioxidant potential of methanol extract ofA.spinosus(MEAS) was established byin vitroalpha amylase enzyme inhibition by CNPG3 (2-chloro-4-nitrophenol a-D-maltotrioside) and in vivo antioxidant potential of malondialdehyde (MDA), glutathione (GSH), catalase (CAT) and total thiols (TT) in alloxan-induced diabetic rats. This study provided evidence that the methanolic extract of A.spinosus has potent alpha amylase, anti-diabetic and antioxidant activities.*[7]*

Anti-Inflammatory Activity

The petroleum ether, ethanol extract of whole plant and methanol extract of leaves of A.Spinosus exhibited anti-inflammatory activities in a dose dependent manner in carrageen aninduced paw oedema, and produced significant inhibition of acetic acid induced increase in vascular permeability indicating that the extract. has anti-inflammatory activity. In the cotton pellet granuloma tests, rats were treated orally with the extract for 4 consecutive days after the subcutaneous implantation of a sterile pellets. The highest dose of the extract (100mg/kg) was able to significantly reduce the post implantation weight of the cotton pellets compared to controls indicating its effectiveness against acute inflammation. Amaranthus spinosusextract also showeda highly specific prostaglandin synthesis inhibitory activity in-vitro in an anti-inflammatory model test system, indicating that it possess anti-inflammatory activities.*[8]*

Photograph

Conclusion

Amaranthus spinosus Linn is having lots of medicinal uses and also have rich in phytochemicals. Ongoing and detailed research are required for the identification, cataloguing and documentation of this herb, which may provide scientific information for further exploration and necessary development of this herb for the pharmaceutical industry.

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